

CHAPTER 7

SPECIFIC AREAS

7-1. This chapter provides information and guidance related to planning and design of specific areas within recreation areas, sites, or facilities.

7-2. Camping Areas.

a. General. Camping areas are provided at projects as designated in an approved master plan or other approved documents. The design of facilities should provide for public use while protecting the resources. A range of design criteria is established to provide flexible standards for the designer to adjust to existing conditions, resources and, where appropriate, local sponsor's standards. Various levels of campground development can be provided to satisfy diverse camper preferences. Camper surveys indicate a preference for water oriented campsites. Camping areas should be physically separated from day use areas.

b. Area Design. An analyses of slopes, soils, vegetation, climate, and adjacent land use are important first steps in determining location of camping areas. Team concept and field design are the keys to providing quality campsites. Utilizing available shade, minimizing erosion and drainage problems, and retaining the aesthetic quality can only be accomplished by careful field design.

(1) Slope Analysis: General Guidelines. Finished slopes are not to exceed 3H:1V or the material's natural angle of repose wherever possible.

(a) 0-1 percent slope - Drainage could be a problem, watch for high water table, unstable soils, and surface rock formations.

(b) 2-6 percent slope - Few limitations, camping areas should be primarily located on slopes of this nature.

(c) 7-14 percent slope - More expensive construction (cuts and fills) and greater impact on natural resources. Slopes in excess of 15 percent should be avoided.

(2) Vegetative Inventory. Determine what trees and shrubs, if any, can be utilized in the campground for shade, buffer, screening, or privacy. Also locate unique areas to preserve such as remnant hardwood forests, glades, wetlands.

(3) Adjacent Land Use. Identify existing land uses that enhance or detract from a user's camping experience.

(a) Enhancers. Panoramic views, vista clearings, natural interests (such as rock formations on shorelines), road/access, availability of utilities.

(b) Detractors. Generators of noise, smells, and unsightly conditions such as rock quarries, landfills, sewage treatment facilities, chemical by-products, major intrusions (powerlines, traffic corridors, pipelines).

(4) Climatic Conditions. Consider weather effects, such as sun exposures, wind directions, rainfall predictions, on both a seasonal basis and a micro/macro environmental scale.

c. Sizing. Determination of a campground size is dependent upon the carrying capacity of the resources, the type of camping, camping demand, economics, and type of management. This information is normally determined in the master plan and/or feature design memorandum.

(1) Demand. The demand for camping at a project depends primarily on the regional population, the character of the population, other available camping in the area, and the amenities offered, both natural and manmade. Anticipated visitation at new projects can be determined by comparing existing projects in similar settings. For updating existing projects, visitation records, visitor surveys and the experience of on-site personnel can provide valuable information in determining anticipated demand. Provide one camp space for each camping unit anticipated on a normal weekend day during the peak month of visitation.

(2) Economics. The number and density of camping units in a campground will largely determine the cost of constructing the facilities. For general and group camping, densities which will minimize road and utility lengths and provide adequate distance between pads will also reduce costs for operations and maintenance. A useful guideline for construction and operational cost effectiveness for the optimum number of camping sites in a campground should be approximately 150. A lesser number of campsites generally creates high per user costs and greater numbers may create problems of visitor control and overcrowding of facilities. For walk-in or boat-in primitive camping, an exception to this guideline can be made.

(3) Carrying Capacity. A camping area should be designed to accommodate the anticipated numbers of campers while minimizing impacts on the natural resources. The terrain, slopes, climate, soil types, and vegetation will determine the carrying capacity. One must also consider the social carrying capacity of an area. It is important that these elements are evaluated by the multidisciplinary team through the design and construction stages of developing a campground. See WES IR R-80-1.

d. Traffic Controls. Campgrounds should have only one entrance. A controlled gate structure will improve campground safety, reduce vandalism, and provide for controlling the hours or seasons a campground is available for use. A well designed entrance area layout will allow for orderly fee collection, while controlling ingress and egress to the campground. The design should include a turn around at the entrance station for visitor convenience. It will also provide an area for disseminating information about the area. Camp loop roads should be one-way whenever possible to enhance traffic flow and minimize clearing and cuts and fills. Two-way roads and cul-de-sacs may be provided when justified by physical constraints. Camp loops should be designed so that they can be closed if necessary to consolidate campers for management purposes.

e. Facilities. Campground facilities can range from minimal development in primitive areas to full hookups and waterborne sanitary features with showers in maximum development areas. Four levels of development are shown on table 7-1 to be used as guidelines for the range of facilities. It is not necessary for every project to have all four levels of development. Terrain, location, resources, and user preferences will dictate the extent of development in a given area.

(1) Tent and Trailer Camp Space. Provide one camp space for each expected camping unit on a typical weekend day during the peak month of use. A variety of camping spaces (back-in, pull-through, multi-unit, etc.) should be used as dictated by existing terrain features and anticipated user preferences. Typical layouts of various camp spaces are shown in figures 7-1, 7-2, 7-3, and 7-4. Also reference WES MP R-85-1 and IR R-87-1.

(a) Terrain and vegetation will largely determine the spacing of developed camp spaces. Where adequate vegetation for screening and buffer is available, the camp spaces may be placed closer together. Optimum spacing between sites, should range from 50 to 100 feet center-to-center.

(b) Camp spaces should provide a near level (max 2% in all directions) parking areas of not less than 45 feet in length and 12 feet in width. Access to the camping space should be ramped up or down (max 10%) from the access road to avoid excessive cuts and fills.

(c) Back-in camping spurs should be aligned at 40 to 60 degree angles to the flow of traffic. If greater angles are necessitated by terrain, a turning radius should be provided by flaring the entrance to the spur. Wheel stops should be provided.

(d) Pull-through camp spaces should be located on the right-hand side on one-way roads.

Table 7-1
LEVELS OF CAMPSITE DEVELOPMENT

DEVELOPMENT LEVEL FACILITIES	MAXIMUM	INTERMEDIATE	MINIMUM	PRIMITIVE (Walk-In)
Access Roads	Paved	All Weather Stabilized Surface	All Weather Stabilized Surface	Gravel
Circulation Roads	Paved	All Weather Stabilized Surface	Gravel	None
Comfort Stations	Waterborne Flush	Waterborne Flush, Vault, Chemical or Compost	Vault, Chemical or Compost	Vault, Chemical or Compost at Trail Head
Washhouse	Yes	Optional	None	None
Designated Spaces	Paved or Compacted Gravel, Multi-use	Compacted Gravel, Multi-use	Compacted Gravel, Multi-use	Space Dictated by Location of Fire Ring
Multi-Family Pads	Up to 30%	Up to 30%	Up to 30%	None
Potable Water	Individual Sites	Multiple Source	1 Source	At Trail Head
Sanitary Dump Station	Yes	Yes	Optional	None
Individual Sanitary Hookups	Optional	None	None	None
Wastewater Drain	Optional if Tied to Sewer System	None	None	None
Refuse Containers	Centralized Locations or Individual Site	Centralized Locations	Centralized Dumpster	Dumpster at Trail Head
Picnic Tables	Yes	Yes	Yes	Optional
Fire Rings and Grills	Fire Ring and Grill	Combination Unit Fire Ring/Grill	Fire Ring or Grill	Fire Ring
Individual Electrical Hookups	Yes	Optional	None	None
Lantern Poles	Yes	Yes	Yes	Optional
Amphitheaters	Yes	Optional	None	None
Playground Equipment	Yes	Yes	Optional	None
Group Shelter	Optional in All Camping Areas	In Group Camping Areas	Optional In Group Camping Areas	None

LAYOUT REQUIREMENTS

1. Stabilize living area and maintain a 0-2% grade.
2. Maintain a maximum 2% grade on rear 30 ft. of parking area with a 10% maximum grade on the entrance.
3. Retain existing vegetation when it does not conflict with grading.
4. Maintain a minimum of 10 ft. distance between the table and fire grill.
5. Do not place fire grill within the circulation paths between the table, tent pad and parking area.
6. Maintain a 5 ft. minimum horizontal distance and a 20 ft. minimum vertical distance between fire grill and vegetation.
7. Locate fire grills downwind from picnic tables if possible.
8. Patio may be detached from parking spur if area features are more compatible to the layout.
9. Evaluate potential camping unit location and adjust for optimum topographic, vegetation, drainage, etc.
10. Living area (patio) should be approx. 625 sq. ft. in area and situated to correspond to entrance door of R.V.
11. Camp spur may be curved to better fit site conditions.
12. Cut and fill slopes shall be designed based on soil and site conditions (3 horiz. to 1 vert. or flatter is desirable).
13. Patio area may be terraced where site conditions require and be accessed by steps.
14. A separate tent pad area 12' x 14' is optional and may be included where site conditions allow.
15. When living area is located between the parking spur and circulation road, sufficient space and buffer must be provided for privacy.

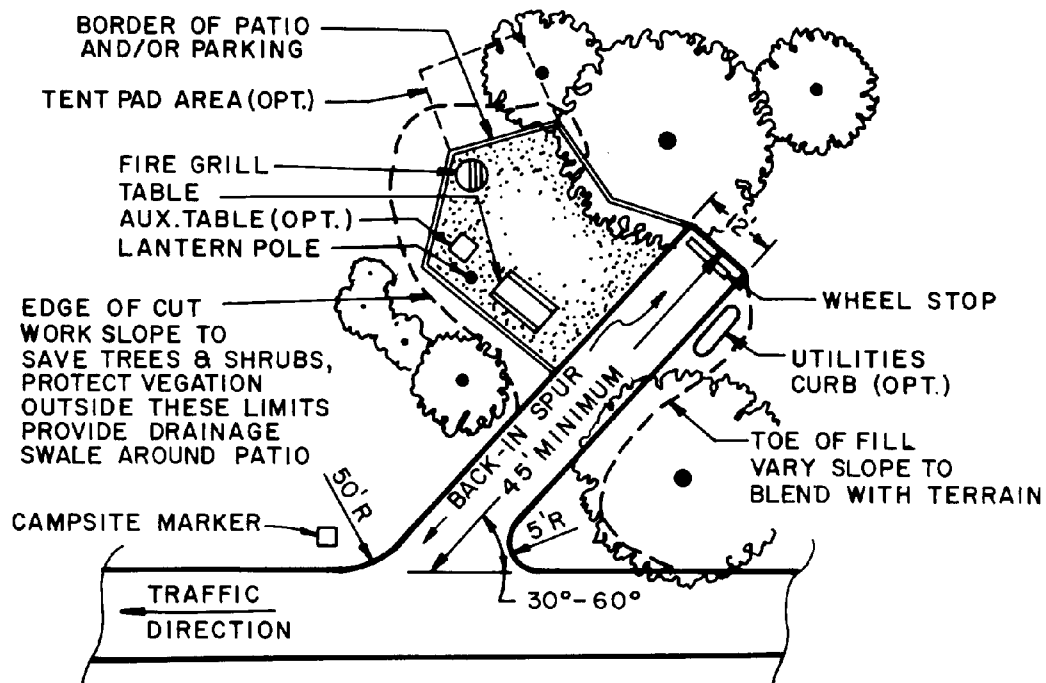


Figure 7-1 Single Back-In Camping Unit

LAYOUT REQUIREMENTS

1. Same as Fig. 7-1, Single Back-In Camping Unit.
2. Patio area for double unit may be increased up to 175% of single unit patio as necessary.

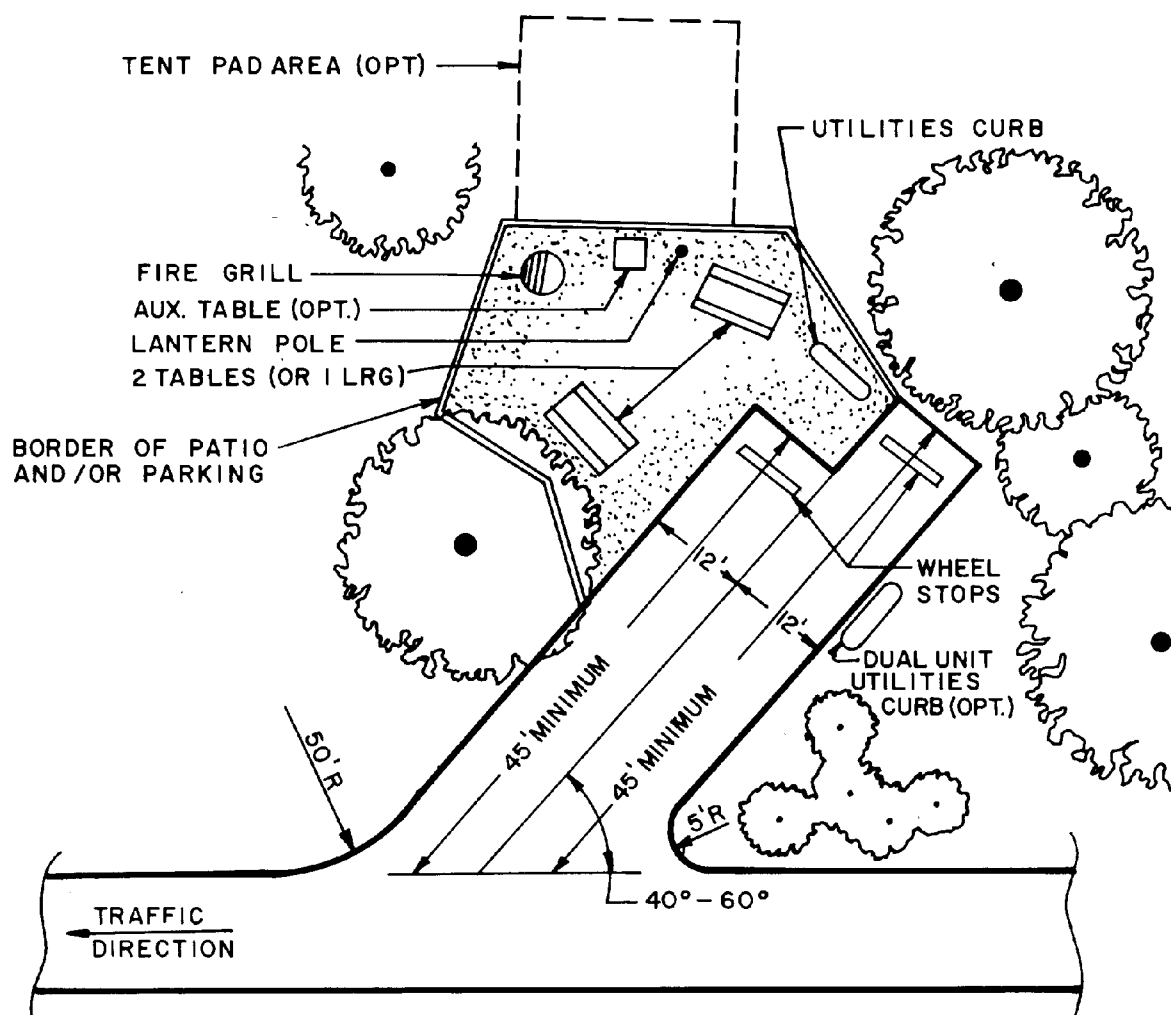


Figure 7-2 Double Back-In Camp

LAYOUT REQUIREMENTS

1. Same as Fig. 7-1, Single Back-In Camping Unit.
2. Pull through unit shall be located only on right side (passenger side) of circulation road.

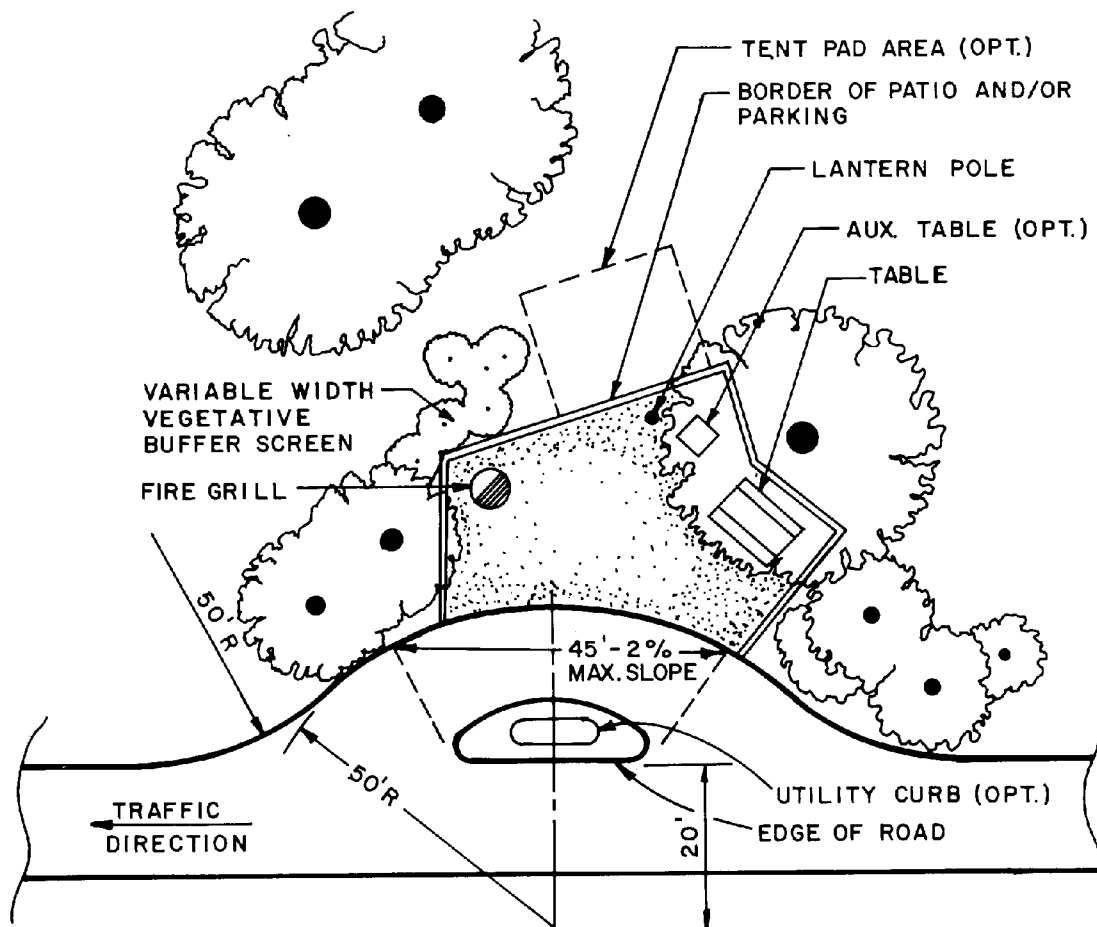


Figure 7-3 Single Pull-Through Camping Unit

LAYOUT REQUIREMENTS

1. Same as Fig. 1, Comments 1 and 3 thru 6 for Single Back-In Camping Units.
2. The 4 ft. wide access trail should have a stabilized surface.
3. Living areas should be located a minimum 50 ft. from parking area.
4. Divert runoff water from adjacent areas around living area.
5. Number and arrangement of parking facilities to be determined by user requirements and site conditions.

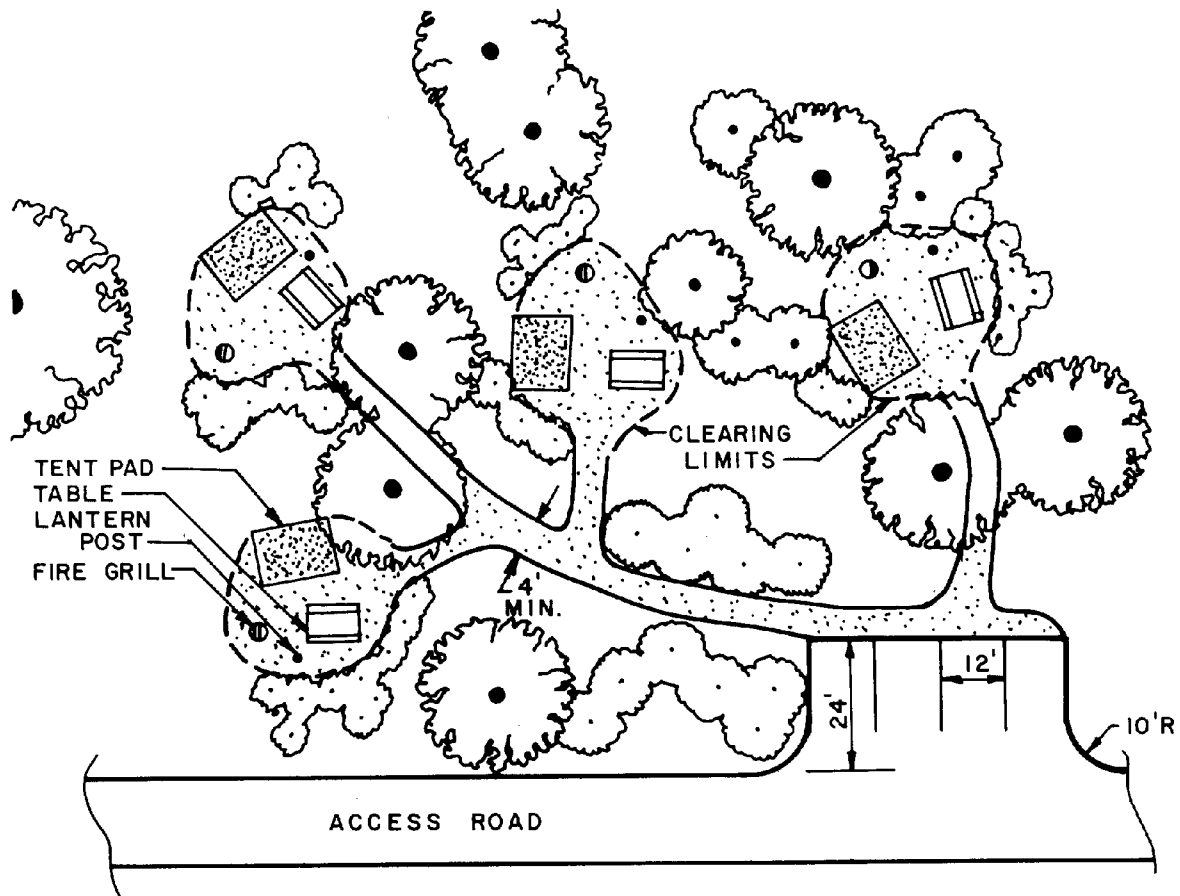


Figure 7-4 Walk-In Tent Sites

(e) Patio or living area should be located adjacent to passenger side of parking space. Living area should provide adequate space for placement of support equipment (picnic tables, grills, lantern hangers, etc.). Generally, 625 square feet is adequate. Additional space for a tent pad (approximately 12 feet by 14 feet) may also be provided at a portion of the sites. Support equipment should be restricted to the living space.

(f) The impact area (parking and living area) should be constructed of a reinforced base such as compacted aggregate. Avoid coarse materials such as pea gravel or creek gravel which have a tendency to roll. Impact area should be outlined with timbers or railroad ties, installed and maintained at grade to define the camp space, minimize site impacts and provide flexibility of campground management.

(g) Utility hookups should be placed to the left rear of a single parking unit or the rear of a double parking space (see figure 7-1). Provide curb or bumper posts to prevent impact of vehicle with hookup.

(h) Consider shading when siting camp spaces. Landscaping or existing tree cover should eventually provide approximately 60 percent shading for the impact area. Morning sun and afternoon shade is most desirable. Open field construction should be avoided due to the cost of landscaping and establishing tree cover. If landscaping is required, select plant materials that are indigenous to the area.

(i) Each campground should contain some campsites which are wheelchair accessible. Such sites should be paved or hard level surface. Tables should have overhang on one end of the table. Width of parking space should be increased by two feet. Campsites designed for the handicapped should be conveniently located near accessible sanitary facilities.

(j) When demand and site conditions permit up to 30 percent of the sites in a campground may be group or tandem sites.

(2) Campground entrance stations should be provided at all fee areas to provide visitor control and collect fees. The station should have exterior security lighting, adequate visibility, and restroom facilities in or near the building. A telephone may also be provided for the safety and security of the visitor. Dual lanes should be provided to accommodate traffic which does not need to stop.

(3) Washhouse. Washhouses and comfort stations should be provided in each developed campground. See chapters 3 and 4 for design criteria.

(4) Non-Waterborne Toilets. Non-waterborne toilets may be provided in areas without water and sewage systems or where needed when waterborne facilities are closed for the season.

(5) Wastewater Drains. Individual camper hookups may be provided where a sewage disposal system is available. Optional grey water drains may be provided in accordance with State and local requirements.

(6) Sanitary Dump Station. Provide one for each campground, as appropriate. The preferred location is along the outbound lane of the access road near the campground exit. Stations should contain two water towers--one for cleaning and another to refill potable water containers. Towers and drain should be accessible from both sides. Provide visual screening as appropriate.

(7) Water Supply. Water hookups may be provided to individual campsites; however, a minimum of one water tap with pressure reducing valve for up to 10 camping units should be provided. Locate not more than 300 feet from farthest campsite where possible. For a primitive area, provide the water tap at the trail head.

(8) Electrical Hookup. Electricity may be provided at each camping unit where fees will be collected. Each pedestal should have a 3-prong 15/20 amp receptacle with GFCI breaker and one 3-prong 30 OR 50 amp receptacle installed in accordance with the National Electrical Code (NFPA-70).

(9) Play Areas. May provide playgrounds and play areas. May also provide areas for open play softball, horseshoe pits, etc.

(10) Boat Tie-up and Beaching Areas. Where the opportunity exists along the shoreline an area may be provided to accommodate campers boats. Consolidate the area to minimize conflict with other shoreline uses.

(11) Swimming Beach. A small beach may be provided in the campground where natural site conditions permit.

(12) Parking for Visitors and Extra Vehicles. Provide adequate space for parking of boat trailers, visitor parking, and extra vehicles within the campground complex or for emergency parking. Posts or anchoring devices for securing boat trailers may be provided. User requirements and site restrictions will determine the number of visitor parking spaces. Parking can be designated at or near the entrance station or at centrally located areas in the camp area, or at individual sites where conditions permit.

(13) Fireplace or Grill. Furnish a combination fireplace--grill and/or pedestal mounted grills for each camping space.

(14) Picnic Table. Provide a table within the impact area for each camping space (except primitive area).

(15) Refuse Accommodations. Provide centralized or clustered trash receptacles. Utilize individual plastic bags to be deposited by the camper to centralized dumpster, where practical.

(16) Serving Table. Optional convenience facility furnished at well-developed area for preparing meals.

(17) Lantern Poles. Provide at each campsite to prevent lantern damage to trees.

(18) Campsite Markers. Campsite numbering may be on a separate post, on trash can holder, or marked on the spur surface.

(19) Amphitheaters. Small amphitheaters with rustic seating may be provided at campgrounds. These should be provided with electricity, a screen for projectors, a fire circle, lighting, and a podium. Seating should be oriented, where possible, to avoid direct viewing into the sun.

(20) Boat Ramps. Boat launching ramps with courtesy dock may be provided for the convenience of the camper. Campground ramps should be for the use of campground users only. A limited boat ramp parking area should be provided where site conditions permit.

(21) Primitive Facilities. (Walk-In/Boat-In Areas) Clear and designate camping spaces in areas of naturally level slope. Provide fire-place or fire circle. Provide refuse container at trail head. May provide non-waterborne toilet facility. May provide parking and potable water at trail head according to projected needs.

f. Group Camping. Areas for two kinds of group campers can be provided: campers that travel together in caravans and groups such as church or youth organizations. Caravan campers can be accommodated in typical campgrounds, especially when camping loops are provided which can be reserved by the group. A group fire circle can be provided. The organized group camp area should be removed from other public use facilities, varying in size and designed to accommodate groups on a non-exclusive, short-term reservation basis.

(1) Campfire/Fire Circle. Provide one for each small group camp. May contain small amphitheater.

(2) Group Shelter. A shelter may be provided for each group camp loop. Fireplace or cooking facilities may be provided in shelter with two side walls optional. Large group shelter provided at central location if desired. Waterborne restroom facilities may be included as a part of the structure.

(3) Water Supply. Furnish one tap for each small group camp area.

(4) Electric Supply. Electricity may be provided as required for health safety and security.

(5) Washhouse and Comfort Stations. These facilities may be provided in group camp areas in accordance with design criteria in chapters 3 and 4 of this manual. Non-waterborne toilet facilities may also be provided.

(6) Play Area. Provide cleared area for field games such as tag, flag football or kickball. Support facilities such as backstops are optional.

7-3. Picnic Areas.

a. General. Picnic areas are provided at projects as designated in an approved master plan or other approved documents. The design of facilities should provide for public use while protecting the resources. A range of design criteria is established to provide flexible standards for the designer to adjust to existing conditions, resources and, where appropriate, local sponsor's standards. Vairous levels of picnic development can be provided to satisfy diverse user preferences.

(1) Site Planning. Sites for which development is being planned should be analyzed to identify significant natural features such as overlooks and determine how they can be utilized to enhance the planned facility.

(a) The interdisciplinary team should inventory the site and gather information relating to topography, vegetation, streams, drainage sources, soils, and other natural features which will influence the basic design.

(b) A decision which must be made early in the design process relates to traffic control and how vehicular traffic will be handled. Also of importance, is land use adjacent to the site. Major transportation routes or highways may require extensive screening or special buffer treatment to eliminate noise. Undesirable development or conflicting activities located near the proposed facility may also require a buffer or screening.

(2) Support Facilities and Special Site Relationships. The support facilities to be located in the picnic area should be governed by site specific requirements. Standards relating to design and placement of facilities vary from state to state but might be used as a guide, if appropriate. A major factor in the number of facilities planned for a development is the carrying capacity of the site. Picnicking frequently occurs in conjunction with other day use activities, such as swimming and hiking. Support facilities, such as restrooms and parking areas, should be conveniently located for users of multiple activities.

(a) Sanitation. The type of comfort station in a picnic area should relate to the level of services provided and be in compliance with state and local code requirements. Vault-type, chemical or composting toilets may be considered where utilities are not available. Comfort stations should be conveniently and inconspicuously located in the picnic area without distracting from the site. Screening to lessen visual impact may be appropriate.

(b) Shelters. A shelter may be provided over each table where shade is necessary and tree cover is not available. Group shelters should be available for visitors regardless of tree cover. The size of such shelters should be determined by the estimated visitor use. Panels or walls may be necessary on one or perhaps several sides of the shelter to protect users from prevailing winds. An integral fireplace/cooking grill and electrical service may be provided.

(c) Parking. The number of parking spaces required for a picnic area should be based on projected use and resource carrying capacity. Fewer parking spaces are required in areas with frequent turnover rates compared to sites where visitors remain throughout the day. Parking should be located to minimize road crossing and be near the facilities they serve but care should be taken not to occupy prime development areas. Screens or buffers may help to lessen the impact of the parking area. Surfacing of the parking area is dependent on the level of use. Parking areas should be marked to prevent unstructured parking and less efficient utilization of parking space. Buses and large recreational vehicles may require special design considerations. Overflow parking, usually gravel or turf, should be provided at all anticipated heavily used areas.

(d) Water Supply. The quantity and location of drinking fountains or spigots should be determined by visitor use. An ideal location is attached or adjacent to a comfort station, although other locations should be considered not more than 300 feet from the most distant site. Spigots and wells are to be constructed in accordance with public health regulations.

(e) Grills. Adjustable grills may be provided at all sites.

(f) Tables. Table and bench combinations may be constructed in accordance with paragraph 6-2. If the unit is stationary, a wearing pad of concrete, asphalt, or finely crushed gravel will eliminate dust and mud around the table. Portable units should be moved periodically to prevent deterioration of the site. For group picnicking areas, tables should be spaced as needed.

(g) Playgrounds. Open, level areas should be available for participation in field sports. Play equipment may also be provided.

(3) Interrelationship of Support Facilities to Enhance Revenues. Special design considerations must be taken into account when fees will be charged for the use of facilities. These special features generally relate to the convenience of fee collection and proper separation of the fee activities from the non-fee activities.

(4) Visual Resource Protection. Care should be taken during design to protect the existing visual resources and also to ensure the completed facility does not in itself create an unsightly appearance. Borders, screens, and buffers created by the use of plant materials and earth berms should be used to eliminate or lessen the visual impact of objectional views.

(a) Sign Proliferation. Over use of signs is distracting and confusing to the visitor. Signs should be used only when absolutely necessary and be in compliance with chapter 4 of EP 310-1-6. A fully coordinated project sign plan should be developed as part of the design process. A substitute for directional signing could be plant materials or physical structures such as low fences or retaining walls.

(b) Location and Screening of Trash Facilities. Facilities for trash collection must be conveniently located where they will be used, but not dominate or appear unsightly. Screens created from plant materials or walls assist in keeping these facilities out of view.

(c) Use of Natural Materials to Screen/Enhance Views. Proper placement of plant materials will screen unsightly views. Plants can also be used to enhance views by creating a frame or border for the desired vista.

7-4. Swimming Areas.

a. General. Swimming beaches will be provided at water resource development projects as authorized in the Master Plan or other approved document. The primary priorities in the design of a beach will be the safety of the user, the effects that the physical features of the site will have on the beach and future operation and maintenance considerations such as fee collection for special use permit areas. Beaches may be designed in support of multiple use activities or as a single use area. Small beaches may also be designed in conjunction with support facilities such as shelters to disperse visitor use. In addition, as specified in ER 1130-2-400, where concentrations of swimming exists, beach development should be considered to ensure safety of the visitor and protection of the project resource. The design of Corps managed beaches will consider the policy that lifeguards are not provided at Corps beaches. The basis for evaluating site selections must consider:

(1) Existing or projected visitation. User patterns should be determined from visitation records, area use observations, and user survey data sources. For new beaches visitation trends at similar areas at the project or other locations should be used to establish sizing requirements for the beach.

(2) Accessibility. Beaches should only be developed where vehicle entrances are feasible. A where such entrances can be controlled or separated from other area uses. Access to a beach in a multiuse area should not interfere with other uses, create safety hazards, or adversely impact the area.

(3) Slope gradients. The slope of the land both above and below the water line is one of the determining factors in the selection of a good beach site. Slopes in the underwater portion of beaches should ideally range from 2 percent to 5 percent, but because of terrain, beaches may be required where slopes approach 10 percent. The most desirable slope being as flat as possible to disperse swimmers. Beach bottoms will be designed to eliminate sudden changes in grade or drop-offs in the 0-5 foot depth. Pre and post-impoundment studies are required to ensure acceptability of gradients at all future beaches. Daily, seasonal, and yearly water level fluctuations due to irrigation, flood control, evaporation, power generation, or other factors must be considered in beach design to assure optimum utilization. On any beaches developed in the future, a detailed inspection of the underwater portion of the beach will be accomplished just prior to opening to the public. The inspection should include necessary detail to reveal sinkholes, depressions, or dangerous drift material and corrective actions should be taken prior to opening of the beach. Record of these inspections and corrective actions should be placed in project files. Safety will be the prime consideration in beach development.

(4) Soil composition and stability. Sites should be selected which offer a proper base for a sand beach. Beaches should not be located in areas where extensive siltation occurs or is expected to occur.

(5) Water Characteristics.

(a) Water quality at all beach locations must be acceptable for swimming. Prior to detail design water quality sampling data must be collected, analyzed and coordinated with appropriate State agencies.

(b) Beaches will be located where adequate water circulation is present to assure continued acceptable water quality. Barriers and coves generally offer the best protection against wind and wave action; however, dead water coves should be avoided. Adequate circulation is also necessary to remove surface debris that may deposit on the beach.

(6) Health Considerations. Swimming beaches will be planned to provide protection from boats, fuel spillage, sewage and industrial outfalls, and boat wakes. The beach should be sited to ensure maximum southern exposure where possible. However, in non-Corps areas where lifeguards are provided western exposures should be avoided if possible so as to reduce afternoon glare to the lifeguards. Insofar as possible, beaches should be located upstream from boat ramps, marinas, etc., in order to minimize or avoid effects of fuel spills. Beaches should not be planned where concentrations of waterfowl exist.

(7) Surface Drainage. During the planning and design of a swimming beach, special emphasis must be given to surface drainage.

(a) Surface runoff must not be allowed to drain across the beach area; therefore, the runoff from any area upland of the beach must be diverted. Methods of diversion might include grassed swales, terracing, inlets, landscaped walls, etc. Methods of diversion should complement the beach development and minimize impact to the site. If possible, outfall of diversion should be located downstream of the swimming beach.

(b) Runoff from the parking areas shall be controlled and diverted to an outfall away from the beach area. If outfall is necessary toward the lake, it should be located downstream of the swimming beach.

(c) Runoff from commercial agricultural activities in the watershed such as ranching or farming should be considered when locating beaches.

b. Design Criteria. Figure 7-5 demonstrates a typical schematic layout of a swimming beach area.

(1) Buffer zones. Beaches including turf sunbathing areas should be separated from parking areas with an adequate grass buffer when possible. Trees should be left, as practicable, in the turf areas adjacent to sand beaches. If surface runoff is anticipated to be heavy, diversion contouring or ditches should be designed to carry runoff water away from the beach turf area and swimming area. Placement of picnicking facilities in the buffer area should only be done if absolutely necessary. If such facilities are designed into the beach area, they should be located so as not to interfere with the primary purpose of the beach.

(2) Design Carrying Capacities. Beach sizing should be based on the assumption that approximately 60 percent of the total numbers of bathers will be on the beach at one time with 30 percent in the water and 10 percent elsewhere. As a rule-of-thumb a turnover factor of 3 will be used for design purposes. Ideally 50 sq. ft. of sand and turf and 30 sq. ft. of swimming area inside a buoyed safety zone should be provided for each person. Beach capacities will vary according to the attendance, supervision, size of beach, anticipated usage, and type of beach experience desired. Any space standard used to compute beach capacity should be flexible enough to accommodate these factors on a local level.

(3) Vertical Limits. The upper limits of graded areas should be based on an analysis of daily, seasonal, or yearly water level fluctuations. The lower limits should be 6 vertical feet below the normal summer pool elevation. Any deviations in the minimum limit should be fully justified. The beach and adjacent underwater areas should be graded on a constant slope. Underwater slopes should extend at least 10 horizontal feet beyond the lowest placement of buoy lines.

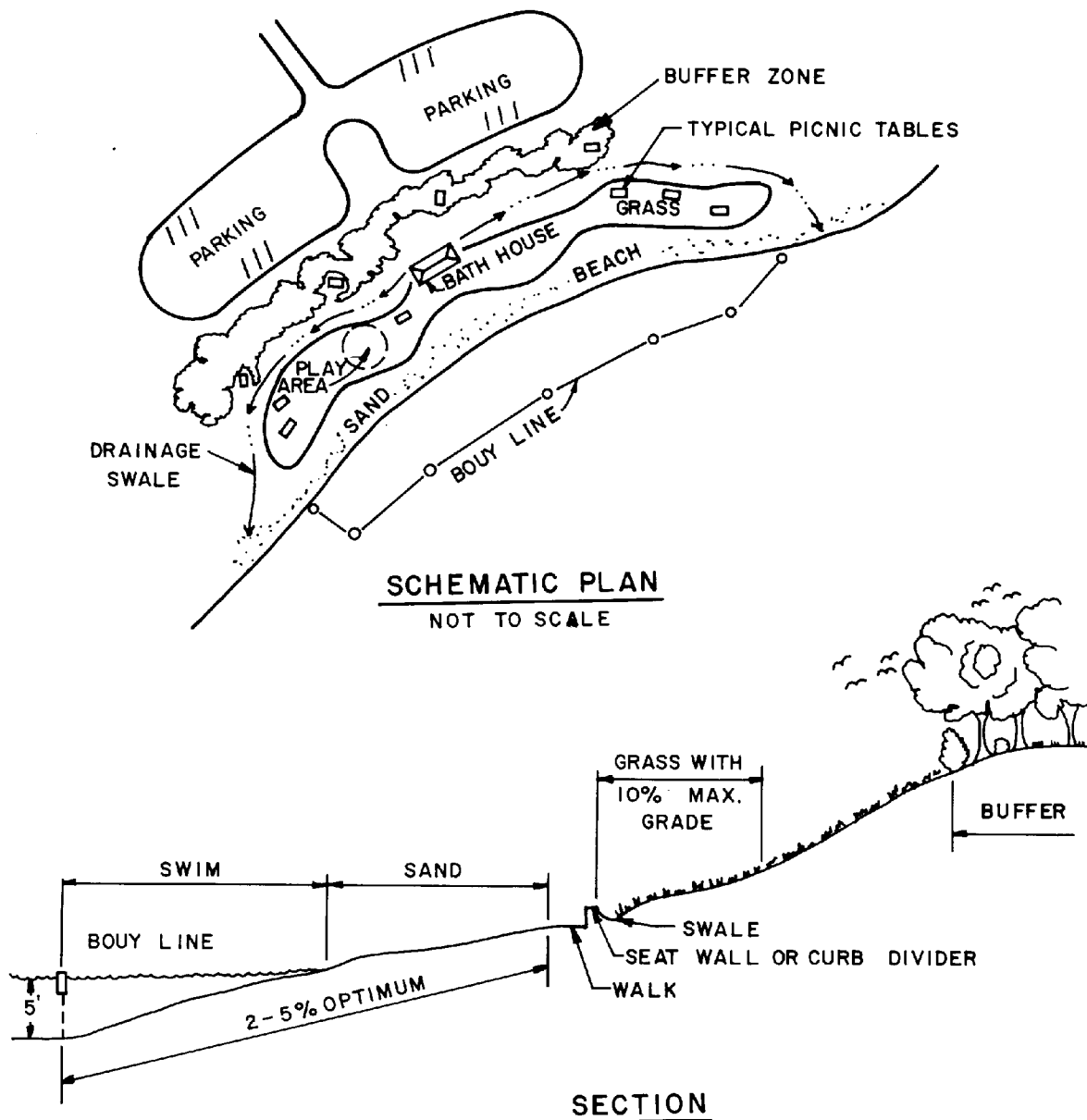


Figure 7-5 Schematic Layout of Swimming Beach Area

(4) Beach Site Preparation.

(a) Beach construction prior to water impoundment: The area will be cleared of all trees, shrubs, and manmade objects. The area will be stripped to a minimum depth of 6 inches. This soil may be stockpiled for later use if suitable. All depressions and holes will be filled with suitable material and compacted. Grading operations shall be performed to establish the gradient specified in paragraphs 7-4a(3) and 7-4b(6). All fills will be constructed in lifts not to exceed 12 inches and shall be compacted to a specified density. Sand as specified below will be placed on a prepared stone base to a uniform thickness to reduce turbidity. A layer of nonwoven filter fabric may be placed on the base prior to sand placement.

(b) Beach construction with water impounded. A detailed survey and inspection of the area is required as stipulated above. Grading requirements will be established based on this survey. All trees and stumps within the beach area will be removed. Holes and depressions shall be filled with granular materials such as sand, gravel, or crushed stone. Special efforts will be taken to ensure that all holes are properly filled. The beach area will be constructed in accordance with above. The swimming area shall be graded to the design gradient. Any fills required to bring the surface to proper grade shall be constructed with granular (cohesionless) material. Sand shall be placed within the designated area. Six inches of sand in excess of the design thickness should be specified to control final grades.

(5) Sand. A minimum depth of 2~0" of sand should be applied on all above water beach areas. Coarse sand should be used if available to resist wave action.

(6) Diving Platforms and Swim Floats at Non-Corps Areas. Diving areas rafts, floats, platforms, or similar facilities are not permitted in Corps managed areas and may be provided at non-Corps areas under lease or license agreement. These types of facilities should be discouraged. If permitted, rafts, floats, or diving boards up to 3 meters high will be located only where a minimum of a 12-foot depth of water can be maintained. A minimum of 15 feet depth of water must be available for boards higher than three meters. All facilities described in this paragraph must be anchored in a safe manner so they will not move from the designed location. Anchors should be designed to permit detachment so the facility can be removed from the water for maintenance or repairs. It is assumed that 20 percent of the swimmers will use a diving facility and a minimum of 50 square feet of surface water should be provided per diver. Rafts used to support diving boards or swim floats should be stable, properly anchored, and large enough to prevent movement during maximum use.

(7) Facilities for the Handicapped. Where practical, a paved walkway at least 4 feet wide with metal handrail should be integrated into the beach area to aid handicapped persons in gaining access to the swimming area. The swimming area for the handicapped should be marked off at the end of the walkway and handrails may be considered for the area.

(8) Buoys and Markers.

(a) The limits of the swimming area will be marked off by buoy lines or foam filled floated pipe lines. The PVC pipe buoy is preferred in beach areas that will experience heavy traffic. Larger beaches may be sectionalized so that one or two sections can be used on slack days and additional sections utilized as needed during heavy use hours or days. International orange colored floats will be provided every 15 feet on buoy lines or at all angles when PVC pipe is used. No lines will be anchored to trees, rocks, or walls.

(b) Off-limits areas around hazardous areas such as shallow water should be marked by buoy lines or floating pipelines.

(c) Ideally, buoy lines used to mark the limit of the swimming area should be placed in water not more than 5 feet deep. However, at lakes where water level fluctuations occur, this would locate the buoy line in shallow water which would critically limit the usefulness of the swimming area. In such cases, buoy lines should be placed in relation to the mean water level. In lakes where significant water level fluctuations occur, buoy lines must be designed so they can be adjusted as necessary.

(d) A minimum of two warning marked buoys or floating signs indicating the "boats keep out" symbol (diamond shape and international orange) should be spaced at a maximum of 200-foot intervals and should be located to provide adequate warnings to vessels approaching the swimming area from various locations. The buoys should be between 100' and 300' from the swimming area buoy lines.

(9) Additional Safety Measures.

(a) Life saving devices consisting of life jugs, a ring buoy and line, and one 10- to 12-foot pole (shepherd's hook) every 200 feet may be located in beaches where lifeguards are not provided. Life jugs may also be provided. Depth gauge poles should be placed at regular intervals along buoy lines. First aid stations may be provided, where conditions permit.

(b) In areas designed for non-Corps sponsors lifeguard facilities may be provided. Where lifeguards are to be provided by the non-Corps sponsor, a lifeguard stand or platform at least 6 feet high should be provided for every 200 feet of beach or fraction thereof. It should be equipped with an umbrella and a storage compartment for a first aid kit and other supplies.

(c) Bulletin boards or signs, prominently placed where swimmers can readily see them before entering the area, will be provided to post emergency phone numbers, safety messages, and other information.

c. Support Facilities.

(1) Bath Change Shelters. A minimum of one bath change shelter should be provided for each swimming area with an expected peak attendance of 600 swimmers on a normal weekend day. These change houses should be between 200 and 500 feet from the water's edge. Whenever possible, dressing rooms should be combined with sanitary facilities and showers. Interiors of bathhouses should be of a readily cleanable material and floors should have a non-slip surface, impervious to moisture and sloped to drain. Open air or outdoor showers should be used where practical to reduce cost. If an open air facility is the only facility provided, a 3- to 4-foot roof shelter may be considered for protection from rain. All bathhouses or shelters should be designed for pressure hose cleaning.

(2) Water Supply and Sanitary Facilities. All beaches with an expected visitation of 400 or more per day should have waterborne toilets.

(3) Parking Areas.

(a) Parking areas should be provided within 800 feet of the beach, with 500 feet being desirable. The size of the parking area should be determined from the beach capacity. As a rule-of-thumb one parking space should be provided per three people. Deviations based on site specific conditions may be justified. Additional parking may be required where multiple use activities are provided and/or spectators are anticipated. Parking configuration should minimize pedestrian conflict with vehicular areas and circulation.

(b) Parking areas should preferably be paved and have parking stripes. Curbing, bumper blocks, guardrails or posts should be provided where necessary.

7-5. Sports and Play Areas.

a. General. Active play areas for all age groups, with consideration for the handicapped, are provided in conjunction with recreation facilities such as camping areas, picnic areas, and beaches. This provision can best be accomplished by designating the necessary space for users to participate or spectate in an area that will minimize impacts on the environment. Where feasible, these play areas should be located in conjunction with other supporting facilities such as parking, restrooms, and water. Additional support items to consider are benches, trash receptacles, water fountains, trails, fencing, etc.

b. Control. Play areas should be designed to prevent the need to cross vehicular roads to access campsites, bathrooms, water fountains, or other points of attraction for young children. If road crossings cannot be avoided, play areas should be located so that necessary crossings occur where there is adequate stopping distance along the roadway. Crossings should be adequately signed and marked. Speed control devices such as rumble strips or speed bumps should be used where deemed necessary. Provisions should be made to promote ease of foot traffic to cross the road without having to jump ditches or confront other obstacles.

c. Sports and Play Fields. Where demand or project visitation and terrain permits, a minimum of 2 to 4 acres of open field should be provided for field sports such as touch football, soccer, track and field activities. This can include activities requiring hard surfaced areas such as all-purpose courts. Refer to TM 5-803-10 for additional types of activities, layout, and construction details.

d. Children's Play Areas. Children's play areas should be included as an integral part of a public use area. The specific layout and shape of each play area will be governed by the existing conditions and the facilities to be provided. In campgrounds, play areas for small children ages 3 to 5 (tot lots), should be small and dispersed throughout the area so they are close to a group of campsites. Play areas for children over 5 can be more centralized and are generally larger. The selection of safe playground equipment should be the major design consideration. Equipment with sharp angles should be avoided. There are commercial sources of well-built durable play facilities available and should be used when cost effective. The play areas should be bordered with materials such as wood, timbers, concrete curbing, to help contain the surface material and to clearly define the play area limits. Care should be taken in selecting the border materials with consideration given to safety, aesthetics, economy, vandalism, and maintenance requirements. The impact area should be designed and constructed to provide for adequate drainage. A cushion material, either natural or man-made, should be provided as the surface for the play area. Metal play equipment such as slides or climbing bars should be oriented or located to minimize heating by the sun. Play equipment should not be located too close to the water. To minimize disturbance to the campers, the play areas should be located reasonably close but not in the middle of a campground. Though standard play equipment such as swings, slides, and merry-go-rounds can be provided, the designer is encouraged to be creative in design, selection, and placement of play equipment such as climbers, play walls, contoured earth mounds or sand areas. Equipment used in play areas should utilize natural materials and features indigenous to the area. When possible, benches or seats should be provided in shaded areas and within close proximity to play areas where children can rest and adults can watch their children. In any case, the design should complement its natural setting with consideration given to the use of existing vegetation and tree cover.

7-6. Fishing Areas.

a. General. Fishing facilities are provided to enhance shoreline fishing opportunities created by the water resource project and to assure safe fishing access. Whether these facilities are located in the vicinity of the dam or tailrace, they should be sited in such a manner that their use will not interfere with the operation of the project or threaten the safety of the user. Detailed guidance on design can be found in the State of New Mexico's Accessible Fishing.

b. Siting.

(1) Restricted Use Zone. Most projects will have established a zone immediately above or below the dam in which public use is restricted. Such areas will be clearly marked and adequate barriers provided. Such barriers may be a combination of physical (railing, fence, cable) and regulatory (signs, buoys) deterrents. Fishing facilities should be sited a minimum distance of 200 feet from the edge of restricted use zones.

(2) Corollary Public Use. Fishing facilities may be provided in conjunction with other public use accommodations such as picnic areas and campgrounds. However, care should be taken to avoid interference with non-compatible facilities such as near swimming beaches or boat ramps.

c. Facilities.

(1) Access. When other convenient means of access is not available, provide stairways to permit safe access of fishermen to tailrace or discharge areas. These may take the form of steps, ramps, or grouted rip-rap. Concrete should have rough-broom finish. Handrails should be provided in conjunction with stairways or ramps.

(2) Platforms. Fixed platforms may be provided along discharge channels. Such platforms and access ramps should accommodate wheelchair users. Provide railing around the perimeter of the platform and access ramp. Platform may be multilevel in areas with large fluctuations. Benches may be provided on the platform. In areas with no current, floating fishing platforms may be provided.

(3) Fence or Railing. Provide fence or railing as required for safety along steep banks and to deter access along restricted use zones.

(4) Fish Cleaning Stations. Fish cleaning stations, either open or screened, may be provided with water spigots, scaling and cleaning benches, carcass grinders and drains as required in areas of concentrated fishing use. Provide a drop pipe into a double baffled septic tank, with provision for pumpout as necessary.

(5) Access Roads and Parking. Provide parking spaces for the vehicles anticipated on a typical weekend day during the peak month of use. Access roads shall be two-way.

(6) Water Supply, Refuse Collection, Electrical Service, Sanitary Facilities. Provide facilities in fishing areas where sufficient visitation exists.

7-7. Hunting Areas.

a. General. Hunting area facilities may be provided at those water resource projects with a sufficient land base and where considerable hunter demand can be expected. In contrast with other public use facilities the overriding concern should be to disperse the use patterns over a large area and to minimize user densities. This may also negate the need to provide sanitary waste facilities and/or refuse collection.

b. Siting. Establish areas clearly separated from high density public use or concentrated private development. Utilize existing road systems that terminate at the project boundary wherever practical. Site facilities at the edge of areas intended for low density, natural areas, or wildlife management area designation.

c. Facilities. Provide a road and parking area to each access point. Parking areas should be delineated with a fence or other restrictive barrier to prevent vehicle access beyond the access point if natural features do not accomplish this. Walk-through gaps should be provided. Signs or bulletin boards should be posted at each access point which describe the limits and use restrictions of the area. Signs should be posted to clearly indicate the boundary of the hunting area to advise hunters when they are entering adjoining private property or high density public use areas. The distance between access points is dependent on several factors including hunter demand, terrain, existing roads, available land area, and predominant game species. Normally the distance between hunter access points should be at least one mile. Portable toilets might be considered in areas where hunting activities occur for only short periods such as 1 or 2 weeks.

7-8. Natural Areas. Natural area facilities, such as boardwalks, observation platforms and blinds, may be provided at water resource projects for viewing unique natural features such as glades, geologic formations, native grass, timber stands, or wildlife. Provide road, parking area and, interpretive display or bulletin board identifying the features of interest. Interpretive trails may also be provided. Sanitary facilities and refuse collection may be provided where sufficient visitation exists.

7-9. Information Areas.

a. General. Information areas provide facilities to promote an understanding of water resource problems, needs, opportunities, and objectives. Facilities must communicate and interpret effectively. Interpretive and information devices must be functional; economical to install, maintain, and replace; and aesthetically pleasing and harmonious with the surrounding resources. Information area facilities include campfire circles, amphitheaters, signs, overlooks, and visitor centers. Visitor centers are addressed in ER 1130-2-401. Interpretive services are addressed in ER 1130-2-428. See Park Practice Program for typical designs of various information area facilities.

b. Campfire Circles. Campfire circles are appropriate for small informal presentations without audio-visual support. Campfire circles may be appropriate for daytime activities in group camps and environmental study areas. One or more campfire circles may be located in an area served by a larger amphitheater for informal presentations and user-initiated activities (e.g., campfire songs, prayer services, marshmallow roasts) etc.). Campfire circles may be provided in campgrounds, group camps (day and overnight), and environmental study areas.

c. Amphitheaters. Amphitheaters are provided for presenting interpretive programs. Amphitheaters may be designed with a stage platform and projector screen for presenting audio-visual programs. Amphitheaters may be provided for interpretive programming in overnight areas (e.g., campground, lodge, or group camp). The following design details are recommended:

(1) Location. The location of amphitheaters should:

(a) Be easily accessible by target audience from trail or road.

(b) Have a neutral or complimentary backdrop with no distracting views in background.

(c) Curtain effect from trees or steeply rising terrain in background is desirable.

(d) Screen security lights and street lights that could shine on projection screen.

(e) Screen stray lights from passing vehicles.

(f) Minimize distracting noises from boats, campsites, etc.

(g) Be located away from other activities (e.g., a concession) which could lure audience away from the program.

(h) Have a north-south orientation of axis of projection booth to avoid light from sunset.

(2) Terrain/Slope. The terrain should:

(a) Be a natural shaped bowl requiring little or no grading.

(b) Not exceed 30 degrees slope measured from horizontal at bottom of screen to avoid distortion in the viewing angle.

(3) Seating. The seating should consider and provide for:

(a) The use of a cone shaped pattern.

(b) One seat per overnight unit.

(c) One seat per user in group camp or environmental study area.

(d) Half logs or pressure treated lumber.

(4) Lights. Adequate low level lighting may be provided for:

(a) Visitor safety and security.

(b) Operational requirements before and after the program.

(5) Electricity. Electricity may be provided by either a permanent supply or portable generators with muffled sound.

(6) Projection Booth and Screen. Where front projection is required:

(a) Projection booth location shall be determined by screen size and projector lenses.

(b) Provide, where practical, remote control at projection booth and at the left side of stage.

(c) The screen surface should be painted white and surrounded with a dull black finish.

(d) The screen should be no larger than 12 feet by 12 feet in size.

(7) Rear Projection Booth. Where rear projection is required:

(a) Provide translucent screen, mirrors, and adequate distance to throw projection onto screen.

(b) Consider work and storage space requirements.

(8) Ground Surface. Impacted areas, such as walkways, aisles, and in front of benches, shall be surfaced with gravel or crushed stone; avoid the use of rounded stone.

d. Signs. The location, design, and construction of administrative signs shall be in accordance with EP 310-1-6, chapter 4. The number of signs shall be kept to the absolute minimum to meet information needs.

(1) Interpretive Signs. Signs and related devices may be used to interpret built, natural, and cultural resources of the water resource project. They may also be provided to interpret major water resource project features, resources, events, or practices.

(2) Interpretive Markers. Interpretive markers and plaques may be used to identify or commemorate a particular site, feature, or event instead of presenting an interpretive story. Markers and plaques may be provided to identify or commemorate a significant site, feature, person, or event when detailed interpretation is not required.

e. Overlooks. Overlooks may be developed to provide a view of the water resource project features. They may also be provided where features of outstanding scenic value or unique interest to the visitor exist. Vistas may be created by selective clearing and pruning of vegetation to enhance desirable views.

f. The design of an overlook should be in harmony with the surrounding area and relate to the feature being viewed. Signs, plaques, or other interpretive devices may be incorporated into the design. Parking and sanitary facilities may be provided when required for health or safety reasons. Selective clearing should retain foreground vegetation to add depth of field. Provide a balance in selection of tree species to remain. Avoid the appearance of clearcutting. The addition of landscape plantings may also be used to enhance the view.

7-10. Marinas.

a. General. Marinas may be provided at projects as designated in the approved Master Plan or other approved document in accordance with guidance in ER 1165-2-400. All aspects of marina design will conform to guidance provided in this manual. The primary objective in the planning and design of marinas is to provide adequate facilities for use by the visiting public. All facilities provided both on land and on the water, must be safe, convenient, and economical to construct, operate, and maintain. Facilities should also be aesthetically attractive and compatible with surrounding facilities.

b. Development Plan. In the planning and design of marinas there are numerous elements which must be considered. A comprehensive site plan showing all proposed marina and support facility development must be prepared in accordance with the approved Master Plan. The type of marina--commercial, club, or municipal will influence specific requirements for operation, security, controls, and amenities. The anticipated usage, based on market analysis, will have a direct influence on the services provided and the type and number of ramps, docks, land storage facilities, maneuvering areas, and traffic flow patterns. Detailed guidance on the design, operation and maintenance of marinas and related facilities is provided in the following references: NWSC B-15; NFPA 303; "Layout and Design Guidelines for Small Craft Berthing Facilities" by the State of California; and Marinas by the National Marine Manufacturers Association.

c. The development of onshore facilities should consider, but not be limited to:

- (1) Access roads.
 - (2) Parking for cars and trailers.
 - (3) Dry boat storage.
 - (4) Sales and service area.
 - (5) Comfort stations (reference chapter 3 and appendix C).
 - (6) Boat launching ramps, equipment, and maneuvering areas for power and sailboats.
 - (7) Sanitary waste disposal and/or treatment systems.
 - (8) Utility supply systems.
 - (9) Fuel supply systems.
 - (10) Fire control systems.
- d. Offshore development should consider:
- (1) Provide safe water depth of boat channels and storage basins.
 - (2) Erosion and silt prevention controls.
 - (3) Ice, wind, wave, flow damage controls.
 - (4) Floating and/or fixed walkways and docks.
 - (5) Floating fuel supply system.
 - (6) Utility supply systems.
 - (7) Sanitary waste holding and/or disposal systems.
 - (8) Fire control system.
 - (9) Water surface fluctuation damage control.